NON-PUBLIC?: N
ACCESSION #: 8908220241
LICENSEE EVENT REPORT (LER)

FACILITY NAME: St. Lucie Unit One PAGE: 1 of 3

DOCKET NUMBER: 05000335

TITLE: Automatic Reactor Trip on Low Steam Generator Water Level During Startup Due to Procedural Deficiency.
EVENT DATE: 07/17/89 LER #: 89-003-00 REPORT DATE: 08/14/89

OPERATING MODE: 2 POWER LEVEL: 004

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Michael J. Snyder, Shift Technical Advisor TELEPHONE: (407) 465-3363

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: IB COMPONENT: JX MANUFACTURER: R335
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 17 July, 1989, St. Lucie Unit 1 was in Mode 2 and performing a turbine startup. Steam Generator (SG) levels were maintained with the 1A and 1B Auxiliary Feedwater (AFW) Pumps. At 0254, the 1B Main Feedwater (MFW) Pump was started, AFW was secured and the turbine was rolled shortly thereafter. SG levels were observed to be decreasing, and AFW was restored. The unit automatically tripped at 0300 on low SG level due to mismatches between steam loads and feed flow rates. The audible annunciator for the low SG levels pre-trip alarms failed before the trip. Standard Post Trip Actions were performed and the unit was stabilized in Mode 3.

MFW flow to the SGs was prevented because the MFW block valves had not been opened. Procedures will be changed to verify their proper line up before starting the turbine. Affected audible annunciators were returned to service. A cognitive personnel error among the utility licensed operators led to the automatic reactor trip.

END OF ABSTRACT

DESCRIPTION OF EVENT:

On 17 July, 1989, St. Lucie Unit 1 was in Mode 2 (critical, power) and performing a Main Turbine (EIIS:TA) startup after having been shutdown to replace Steam Generator (EIIS:AB) (SG) tube plugs. SG levels were being maintained with the 1A and 1B Auxiliary Feedwater (EIIS:BA) (AFW) Pumps.

At 0254, the 1B Main Feedwater (EIIS:SJ) (MFW) Pump was started, AFW was secured and the turbine was rolled shortly thereafter in preparation of a turbine trip test. SG levels were observed to be steadily decreasing, and the 15% MFW Regulating Valve controllers (EIIS:JB) were taken to manual. SG levels were still decreasing and AFW flow was restored.

At 0300, the Reactor Protection System (EIIS:JC) automatically tripped the unit on low SG level due to mismatches between steam loads and feed flow rates. Although AFW had been restored, SG level kept decreasing because AFW capacity could not keep up with steam demand with the turbine rolling. The turbine tripped on a reactor trip signal.

The audible annunciator (EIIS:IB) for the low SG levels pre-trip alarms failed before the trip and did not warn operators that pre-trip setpoints had been reached. The audible annunciator failed due to a failed power supply. Standard Post Trip Actions were performed and the unit was stabilized in Mode 3.

CAUSE OF THE EVENT:

The root cause of the event was that MFW flow to the SGs was prevented because the MFW block valves had not been opened due to a procedural deficiency The position and control indication for these valves is physically separate and distant from the SG feed station.

Contributing factors to this event are:

MFW to SGs flow indication is automatically cutout at low power due to unstable circuit gains. Positive MFW pump suction flow indication is misleading under the circumstances of this event because it represented pump recirculation flow back to the condenser and not to the SGs. Also, manual SG level control at low power is difficult due to the shrink and swell phenomenon of the SGs.

Licensed utility operators did not verify steady state SG levels after switching to MFW and before rolling the turbine. Additionally, operators failed to recognize a flow imbalance for the SGs when AFW was restored and the turbine was still rolling.

The failed audible annunciator for the low SG water level pre-trips did not pre-warn operators that automatic reactor trip setpoints were being approached.

ANALYSIS OF EVENT:

The plant response during this trip was observed to be normal; all systems functioned as designed with the exception of the failure of audible annunciator.

This event was reportable to the NRC under 10CFR50.73(a)(2)(iv) as any event or condition that results in an automatic actuation of the Reactor Protection System.

The event was similar to that described in Section 15.2.8 of the Unit 1 FUSAR, which assumes the loss of all main feedwater and condensate pumps. The actual plant response was much more conservative to that described in the analysis for several reasons: 1) The plant was not at full power when the event began. 2) Auxiliary Feedwater flow was manually reestablished before the reactor trip. 3) S/G water levels did not go below 39%; therefore the capability of the generators to act as a primary heat sink was never in jeopardy. Thus, the health and safety of the public was not endangered at any time during the event.

CORRECTIVE ACTIONS:

1. OP 1/2-0030124, Turbine Startup procedures will be revised to include a verification of proper positioning of the Main Feed Block valves.

2. The Plant Training Department will incorporate this event into future Licensed Operator Requal Training.

3. The failed audible annunciation was restored.

ADDITIONAL INFORMATION:

Failed Component Identification

Audible Annunciator Power Supply

Rochester Instruments (125 VDC)
Model AN-159

Previous Similar Events

The following LERs describe similar low SG level trips at St. Lucie:
389-86-010
389-85-001

ATTACHMENT 1 TO 8908220241 PAGE 1 OF 1

P.O. Box 14000, Juno Beach, FL 33408-0420
FPL

L-89-294
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 89-03
Date of Event: July 17, 1989
Automatic Reactor Trip on Low Steam Generator
Water Level during Startup Due to Procedural Deficiency

The attached Licensee Event Report is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

C. O. Woody
Acting senior Vice President - Nucle
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COW/JRH/cm

Attachment

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC Senior Resident Inspector, USNRC, St. Lucie Plant

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